THE BOTTLEFLY IOS APPLICATION FOR WINE RECOMMENDATIONS

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ABSTRACT

The Bottlefly iOS Application for Wine Recommendations

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The use of smartphone applications has taken over the way people interact with the world. The design of an application has become an important aspect in keeping the user engaged [22]. People are looking for applications that are easy to use and will get the job done. This thesis focuses on the design of a mobile application for iOS that recommends wine in various retail locations that match a user's taste preferences.

The goals of this thesis are to design an iOS application that recommends wine to consumers, improve upon the wine recommendation algorithms by acquiring more customer data, and analyze the market for consumer and retail need for such a wine recommendation system. The mobile implementation developed for this thesis will be used by a startup based in San Luis Obispo called The Bottlefly. The application will supplement a similar in-store kiosk version to reach wine consumers outside of retail locations in hopes of bringing them into retail locations to purchase wine.

Multiple studies are presented to show the results of acquiring customer data for the wine recommendation system as well as user interface usability studies to acquire data about the usability of the application. Usability factors such as ease of use, application completeness, and willingness to use are measured and analyzed in this thesis. The results will help propel the application forward to make sure it meets customer expectations in order to get it ready for production in retail locations and the App Store.

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Chapter 1

INTRODUCTION

The emergence of the smartphone has changed the way technology is used in people's everyday lives. In the context of mobile computing, mobility pertains to people's use of portable and functionally powerful devices that offer the ability to perform a set of functions untethered, while also being able to connect to, obtain data from, and provide data to other users, applications, and systems through the internet [12]. With the rise of smartphones, many mobile applications have emerged that can connect people to each other in more ways than ever thought possible. Not only are people connected to each other, people can now be connected to products that they would not otherwise know existed. Many different technologies collect data about their users to give them a good experience when using it. Collecting data about a user can now be used to recommend products to users such as wine in the case of Bottlefly.

1.1 Bottlefly

This thesis concentrates on the use of mobile technology to connect people ranging from first time wine buyers to veteran sommeliers to wines that will fit their taste preferences. A new startup based out of the San Luis Obispo Hothouse called, Bottlefly, has set out on a mission to connect consumers to fine wines in the retail environment. Customers can be recommended wine based on a set of questions that don't require any prior wine knowledge. The wine recommendations work to help consumers get started on a particular type of wine or help people find new labels of wine to explore instead of just picking out the same bottles over again. Not only will consumers benefit from a wine recommendation system but the retail end will benefit

as well. Currently, many wine selections are being made based on brand recognition rather than taste preference which causes many products to go unnoticed. A large amount of customers end up either picking a bottle that is on sale or something that is familiar. Bottlefly helps the retailer to guide consumers through store inventory to valuable products that would otherwise miss their shopping cart.

1.2 Contribution

The Bottlefly application can be used to help consumers build up a wine profile and then use it to recommended new wine selections. The Bottlefly data can help retailers optimize product mix by providing corporate wine buyers with actionable analytics.

The work of this thesis describes the following contributions:

- Design of an iOS application that recommends wine to consumers
- Improving upon the wine recommendation algorithms by acquiring more customer data
- Market analysis of consumer and retail need for a wine recommendation system

Various studies including blind wine tastings have been conducted to gather information about how people perceive different wines. These studies help the Bottlefly team better understand how different wines taste to different people and how the rankings of various wines by different people can be used to better match a specific wine to a person. The sensory data that is gathered by Bottlefly is focused on matching people to various wine selections but the data can also be used for matching people to different foods such as meat and cheese. This thesis focuses on the sensory data that was used to match people to wine.

With a personalized mobile wine recommendation application, customers are able to try new wines and expand their purchasing habits in the wine aisle. Retailers will also be able to guide consumers to new wines that not only will make the customer happy, but also will provide higher profits.

Chapter 2

BACKGROUND

Various wine recommendation systems exist but none connect people to wine that is right at their local retail stores. Bottlefly aims at reaching customers through the mobile application developed for iOS that will be available on the App Store, but also through kiosks conveniently located in the wine aisle at retail locations. In order to recommend wine to various people and build the trust of the recommendation system, the wine needs to be analyzed all the way down to the chemical properties it consists of.

2.1 Gas Chromatography Mass Spectrometry

Gas chromatography mass spectrometry (GCMS) is an analytical method used to identify different substances within a test sample. Applications for this method include drug detection, fire investigation, explosives investigation, and the identification of unknown samples. A GCMS machine can detect chemicals as small as a picogram which is equivalent to 0.000000000001 of a gram [26]. One picogram is the equivalent of one grain of sand in a pile of sand that expands of the area of a football field piled up 18 feet high. The GCMS machine can quantify and detect these trace amounts of chemicals. This method has never been applied to a recommendation system for wine. Bottlefly analyzes all of the wine that a particular retail location carries and is able to recommend those wines to its customers based on the chemical analysis of the wine in comparison to the preferences of the customer. Using GCMS gives Bottlefly a competitive edge over other wine recommendation systems because Bottlefly isn't only recommending wines that are popular or have good reviews, but it

is recommending wines that have been tailored to match the customer's unique taste preferences based on chemistry.

2.2 Retail Kiosk

In addition to the standalone mobile application developed for iOS, Bottlefly wants to reach more customers by having an iPad kiosk standing next to the entrance of the wine aisle in all retail locations that sell wine. The iPad will be used by people that are passing through the wine aisle that need help picking out a wine and also by people that have not yet downloaded the application on their smartphone. The iPad will serve as a means for people to get a quick recommendation on the go and also increase awareness of the Bottlefly recommendation system. People can then download the recommendation system on their own phone and get recommendations to other Bottlefly affiliated retail locations. Users will be able to also receive an electronic coupon for the wine that they got recommended on the spot that they can use at checkout in the store.

2.3 Problem and Solution

Retail stores have not had a way to entice their customers to buy one of the highest margin products in their stores, alcohol. Grocery stores typically have an average net margin of 1%-2%. Alcohol in retail stores has an average of 30%-50% margins compared to lower margin food products [5]. This huge increase in margins is where the potential lies for retail stores to make huge profits. People that purchase wine, on average, spend an additional $13 per visit on other items. If retail locations can get customers to purchase more alcohol, then they will make more money on higher margin products as well as get customers to buy more products.

Retail locations are currently not able to fully understand their customers and their buying habits in the wine aisle. They may be able to look at past purchasing habits but they don't have a way to see what the customers would enjoy the most. Bottlefly will be able to help retail locations gain insight into their customers by seeing what wines they are getting recommended to make sure that those products are always in stock. Research has shown that value, varietal, and personal recommendations are the most important extrinsic cues when purchasing wine [13]. Retail locations will also be able to optimize their inventory based off the wines the customers are being recommended. Bottlefly only recommends based off of the current selection that a specific location has so the user always gets a recommendation that they will be able to find. Bottlefly will be able to stay up to date with the latest inventory through communication with each retail location as well as through APIs that provide inventory information. By using Bottlefly, a retail location will be able to make their customers happy all while making themselves more money.

Chapter 3

RELATED WORK

Mobile applications have been gaining momentum in the wine industry to help connect wine lovers to new wines. The following sections describe the various wine applications on the market.

3.1 Next Glass

Next Glass is a mobile application that aims at recommending wine and beer to its customers [15]. It is available on the Apple App Store and Google Play Store. Users are able to build a taste profile based on the drinks they have already tasted before. After a drink is consumed, the user is required to rate the drink in the application. Once the drink is rated then that drink and its rating is recorded in the user's profile and recommendations based on the ratings of previous drinks are shown. Next Glass analyzes each drink's chemical makeup to be more precise when recommending a drink that fits a user's taste profile. The chemcial analysis differs from Bottlefly's approach of using GCMS by Next Glass using high performance liquid chromatography (HPLC). Next glass specializes in analyzing beer while Bottlefly analyzes volatiles.

Users are able to see their personal score on each wine and beer in Next Glass's database as well as search for drinks by name [15]. Searching for drinks can also be done by snapping a photo of the bottle's label or barcode. The nutritional information of each bottle is provided and users can build a wish list of drinks to save for later. The application also has a social media aspect to it where users can discover and share drinks with their friends.

3.2 Drync

Drync is a mobile channel where users are guided to wine, spirits, and beer that they would like while driving loyalty and sales for retailers [8]. It is available on the Apple App Store and Google Play Store. The application allows users to shop for wines and help get the locations of specific bottles. Bottlefly differs from Drync by being able to recommend wines that the user is guaranteed to find nearby. Drync can help narrow down the location of wines but those wines may not be close to the user's current location. There is also a personalized recommendation system that is based on the user's ratings of previous drinks consumed. Wine can be browsed by style, region, or grape from hand-picked collections from industry experts.

The application can also be used to scan the label of wine bottles by taking a photo of them [8]. Information about the scanned wine such as reviews, comments, and tasting notes can be seen. Users are able to learn about the different wines by viewing the ratings and reviews of the wine and seeing what experts are recommending.

3.3 Vivino

Vivino is an all encompassing wine application. It is available on the Apple App Store, Google Play Store, and Windows App Store. It is able to take a photo of the label on a bottle to provide the user with information on the wine [23]. Users are able to see the price of the wine and look for the best deals of bottles online. The user can also see a list of nearby wine merchants. To be able to pick a new and exciting wine, users can see the popular and trending wines in their current area. They can also share, comment, and like their friend's wines to promote more wines in a social media like environment targeted for wine. Bottlefly instead focuses on the recommendations of wine and where to find them over focusing on social media to explore new wines.

Users of Vivino can explore new types of wine by following featured users to see what wine experts are enjoying [23]. For a subscription fee, users can become premium members. The premium membership allows for a personalized buying guide where users can get access to little-known wines that match their taste. The user will also be able to get up to date prices on wines to get the best deal on their favorite bottle and they even get their scanned photo of a label prioritized if Vivino doesn't recognize the label so that they will get their wine identified in moments.

3.4 Tap Hunter

Tap Hunter is a mobile application that helps users find beer, spirits, and cocktails [19]. It is available on the Apple App Store and Google Play Store. Users can pull up their favorite spot's live drink list and get personalized recommendations based on their preferences. A favorite drink can be followed through the application so that the user is notified when it becomes available nearby. The user can also see nearby locations and get details about the drinks that location is offering.

3.5 Hello Vino

Hello Vino is a wine application that acts as your personal assistant in the wine store or restaurant [11]. It is available on the Apple App Store and Google Play Store. The application acts as a wine label scanner by snapping a photo of a label on a bottle. Information about the wine will appear such as tasting notes, ratings, and food pairings. The wine can even be ordered through the application. Every bottle that is consumed by the user can be remembered in the application by snapping a photo of the label. A search engine designed around wine can also be used to access information about all the wines in the application's database.

The application can provide a live professional to talk to when purchasing wine to make sure the correct bottle is purchased [11]. Insider deals can be found so that the user can find deals on bottles online. Food pairings can be suggested for each wine and recommendations based off of wines that the user already owns can be made.

3.6 Delectable

Delectable is a mobile application with a wide knowledge about wine. It is available on the Apple App Store and Google Play Store. It is able to scan photos of the label on bottles to retrieve information about the wine such as ratings and descriptions of the wine [7]. The user's favorite bottles can be tracked and users can learn more about the wines they love from winemakers, sommeliers, and wine critics. Wine can be bought directly from the application and delivered to the user's doorstep. The user can also keep a personalized wine journal of the wines they have drank while keeping track of where they drank the wine and who they drank it with. All of the functionality of Delectable works with beer and spirits too.

3.7 Previous Work vs. Bottlefly

There are multiple wine applications on the market today all with the same goal of leading wine drinkers to discover and try new wines. There is a common missing piece to all of the wine applications out there today. The missing piece is that each application recommends wine by either requiring the user to input their own taste preferences for certain wines, by rating previous wines that they have already tried, or by recommending wine based on what other people have bought.

The applications claim to be helping people buy and discover new wines but people that don't know anything about wine are left out until they have started rating some

wines to build their taste profile up. Bottlefly can bridge this gap by recommending wine to users that don't have any prior wine knowledge. Bottlefly gathers sensory information from the user through a series of quiz questions. The questions are asked in a way that even people without any previous wine knowledge or people who have never tasted wine before can answer them. Bottlefly then leads the user to the nearest retail location to buy the wine that they are recommended as well as provide coupons to give users deals on the wine they are recommended. Bottlefly also partners with retail locations to be able to help wine shoppers in the wine aisle and guide them to high margin products that fit their taste profile so that the consumer and retail location both gain from the transaction.

Chapter 4

IMPLEMENTATION

In this chapter, the implementation of the Bottlefly mobile application is discussed. Section 4.1 describes the design approach taken for the application. Section 4.2 describes the use of Parse and Firebase as a backend for the application. Section 4.3 describes the implementation of the authentication for the application. Section 4.4 describes the implementation of the wine quiz.

4.1 Design Approach

The user interface of the iOS application is where the focus of this thesis lies. The goal was to design and create the application in a way that is simple yet engaging. Simplicity is one of the most common virtues of good design [17]. Having the design be engaging will keep the users wanting to come back to Bottlefly for wine recommendations over the competition.

4.1.1 Adjective Cloud

The adjective cloud serves as a way for users to input qualities they may want to see in their wine as well as qualities that express the user's mood. When consuming wine, people can often express what kind of feeling it gives them or what kind of setting they could imagine themselves drinking that particular wine in.

Figure 4.1 shows the screen representing the adjective cloud. Each adjective is associated with a particular category such as flavor or mood. Different design concept ideas were thought of to best represent the adjectives. The best two designs were between a table layout of the adjectives and a cloud layout of the adjectives. Further

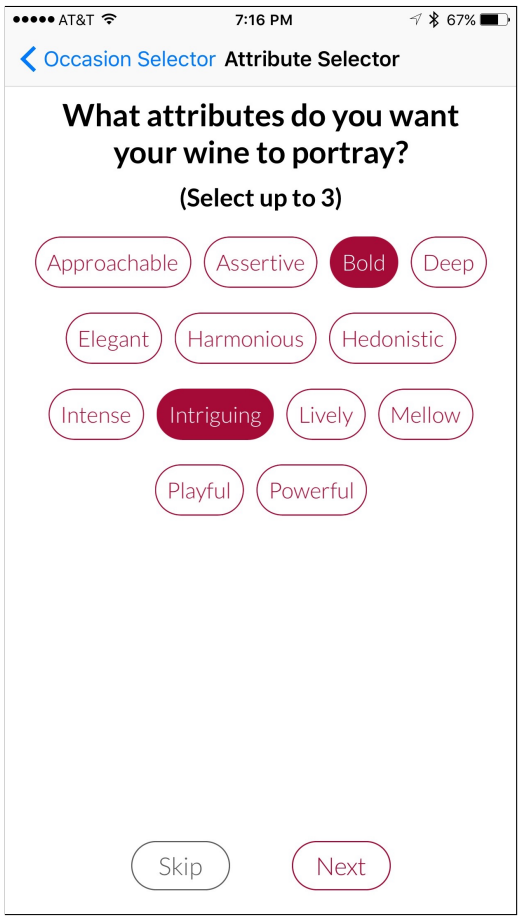

Figure 4.1: Adjective Cloud Screen

discussion of how which design got picked will be discussed in Chapter 5.

4.1.2 Tinder Style Swiping

Tinder has become one of the most popular dating applications to date. One of the reasons for its success is its simple concept of swiping left or right to indicate whether you would like to be a potential match with the person whose profile, or card, you are viewing [17]. Swiping left indicates a NO response and swiping right indicates a YES response. Swiping allows for an easy yet engaging way for users to indicate their responses as fast as possible while not putting the user to sleep with a repetitive task. The Bottlefly application uses the tinder-swiping approach in the Palate Profiler

when users choose which aromas they like or dislike. The Bottlefly application has buttons at the top of the screen so that the user can go back to the previous aroma if they accidentally answer a question wrong or change their mind about a previous response. There is also a button for when a user doesn't know what their preference is or if they don't know what a certain aroma smells like.

Figure 4.2: Vanilla Aroma Screen

Figure 4.2 shows how the card for the aroma is displayed. The design is clean and elegant because the majority of the screen is taken by the image which is engaging to users and their are only a few buttons on the screen that the user needs to interact with. There is also a thumbs up button and thumbs down button for users that wish to push a button to indicate their responses instead of using the swiping functionality.

Figure 4.3: Swipe Yes Aroma Screen

Figure 4.3 shows how the user can swipe right along the image to indicate a YES response. Figure 4.4 shows how the user can swipe left along the image to indicate a NO response. The user can also see a progress bar near the bottom of the screen to indicate the progress that they have made in selecting their preferences to the specified aromas until they are done. This is an important design decision to make sure the user knows when they are done making selections because users may stop using the application if they don't have a sense of an end being in sight.

Figure 4.4: Swipe No Aroma Screen

4.2 Backend as a Service (BaaS)

The mobile application uses a backend authentication system in order to keep individual accounts separate so that every member will have a record of their personal recommendation history. The kiosk version currently skips authentication and lets users quickly jump into the quiz to get a fast recommendation on the go. In the beginning of developing this thesis, the application used Parse as a backend for authentication and storing user data. During the implementation of the application, Parse stopped being supported by Facebook and all applications using Parse had to switch their backend [20]. The Bottlefly application was affected by this decision so the backend was switched to Firebase for authentication purposes and for storing user

data.

Parse was a backend service that developers could use for mobile applications instead of building their own backend code and maintaining their own servers. Parse had APIs for many different authentication methods as well as APIs that users could call to query the data that Parse stored for them. The data in Parse was stored in relational tables where the applications could query for the data using the Parse APIs. The Parse database had many of the features a user would expect from a database such as selecting certain pieces of data and joining pieces of data together.

Firebase is also a backend service developed by Google that developers can use for mobile applications. Firebase has APIs for various authentication methods as well as APIs for data storage and retrieval. One of the unique aspects of Firebase is that instead of data being stored in relational tables like Parse, the data is stored at specific URL locations. An application can have observers on specific URL locations and monitor when the data has been added, removed, or modified and react accordingly [9].

With Facebook no longer supporting Parse as a backend service, the application had to be switched over to another backend. Firebase was chosen as the new backend because it had well documented API's and provided the functionality the application needed for authentication and storing and retrieving user data. Other backends such as Amazon's AWS Mobile Hub and Appcelerator were considered but Firebase won out over the others. The biggest cost of switching to Firebase was learning how to reorganize the data stored for wine recommendations as well as user data. Parse had API's where complicated queries could be formulated together and the information could be sent back to the client with all the information formatted how it needed to be. Firebase stores one piece of data at a given URL. The data can be formatted so that data is in a table-like format but only data from one specific location can be retrieved

at a time. The data at a specific URL location also grabs any and all child nodes that are present at that location so having deeply nested data is not the design pattern a developer should have when storing data using Firebase. Instead, data should be only a few levels deep at most and when a piece of data has multiple attributes such as a list of recommendations for a user in the example of the Bottlefly application, the data should be separated out into different URL locations. For instance, there is a list of recommendations for each user and the list of recommendations holds a wine ID instead of the actual information of the wine itself. The information for a specific wine can be found at a different URL location so that the information for a given wine isn't stored in multiple URL locations.

4.3 Authentication

The authentication for the application allows users that have downloaded the application on their mobile phones to create an individual user account where they can see all their personalized wine recommendations after taking the wine quiz. Users of the in-store kiosk will be prompted to start the quiz without authentication to get a quick recommendation on the go. To keep a history of recommendations for specific users, the mobile application will have to be downloaded to the user's mobile device.

Figure 4.5 shows the login screen that users are presented with when first downloading the application. Users have the option of logging in with Facebook or logging in with their personal email account. The Firebase APIs allow for various authentication mechanisms such as sending emails to users who have forgotten their password as well as updating a user's password. Users that have already made an account but have forgotten their passwords can also press on the 'Forgot Password' button and be prompted to type in the email associated with their account. Once the email associated with the account is entered in, the user will receive an email with a new

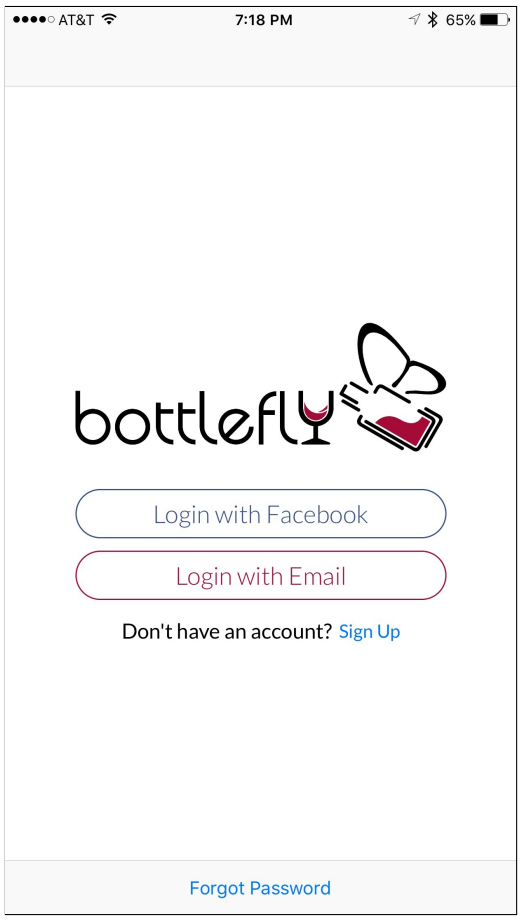

Figure 4.5: Login Screen

temporary password that they can sign in with. The application will detect that the user is signing in with a temporary password and will prompt the user to create a new permanent password. The user can then continue with the application as usual.

When a new user has downloaded the application, they will have to sign up before they are able to login. The user has the option of signing up with Facebook or with their personal email account. Whether the user chooses to sign up with Facebook or email, Firebase will take care of the security measures expected by users when making an account. Every user is given a unique user ID when signing up. This is how Firebase identifies each of its users when they login. A user's recommendations and other personal information is stored under each user's unique user ID.

The authentication protocol also checks for errors when a user is signing up or logging in. Some of the errors that are checked include user input error as well as backend checking of whether an email is already taken or if a user doesn't exist. Each error is presented to the user through an alert that pops over the current screen with a more detailed message describing the error to the user. This helps the user figure out what they have done wrong or if something else out of their control has occurred.

4.4 Wine Quiz

The wine quiz part of the application is the main part of the application that this thesis focuses on. The wine quiz is what gathers the user's taste preferences and formulates wine recommendations based on a mixture of the answers the user provides as well as analyzing the chemical properties of each wine. This section will go through the flow of the data that the user is presented with when taking the wine quiz.

After starting the quiz, the user is presented with a list of retail locations where Bottlefly technology is currently present. Figure 4.6 shows a screenshot of what the user is presented with when selecting a retail location. The retail locations are calculated based off of the user's current location so that they can find a Bottlefly retail location near them. The locations are sorted by the closest locations showing up first. The user also has the ability to see each of the locations on a map view to get a better idea of where the locations are relative to their current location.

Figure 4.7 shows the various Bottlefly retail locations as well as the user's current location. The map automatically adjusts its zoom so that all the nearby locations are in the frame as well as the user's current location. Each location is equipped with an annotation that gives the retail location name as well as the address. The locations that are displayed are locations that are within 5 miles or less of the user's current location. The user's most convenient location can then be selected so that the user is

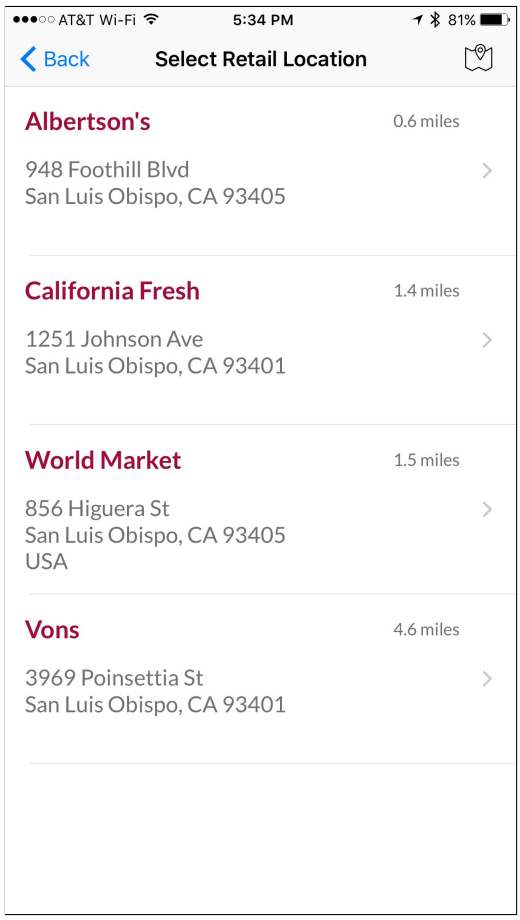

Figure 4.6: List of Locations Screen

recommended a wine that is guaranteed to be on that particular location's shelves.

Once the location is selected, the user is presented with questions from the wine quiz. Each question of the wine quiz is on its own separate screen so that the user isn't overwhelmed with too many questions and content at once. This also helps keep the design of the app simple and clean so that users can speed through the app more quickly. As the user goes through the wine quiz, the responses to the questions are recorded in a QuizAnswers object.

Figure 4.8 shows the QuizAnswers model. The object has variables that hold the answers to each type of question the user answers. The quizID variable is provided by the backend that Bottlefly maintains to make sure each quiz taken by any user

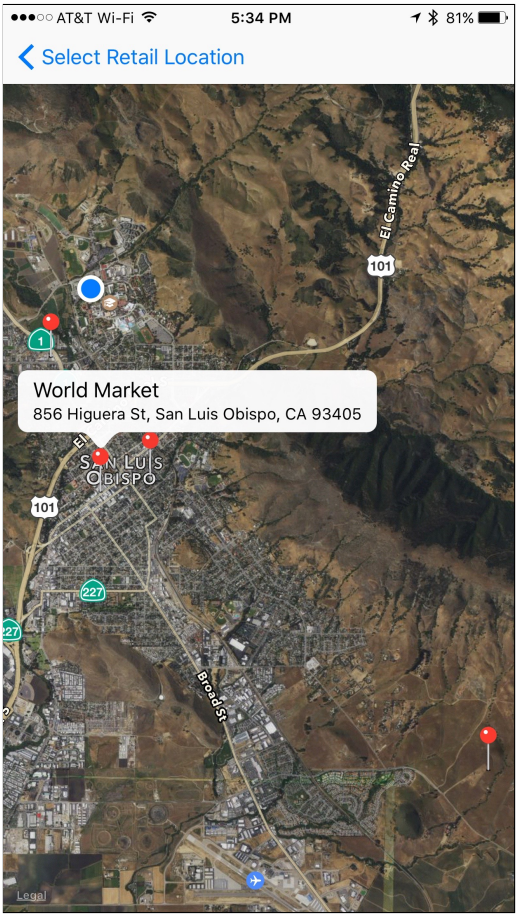

Figure 4.7: Map Screen

QuizAnswers
quizID:Int
over21:Bool
wineColor:String
selectedOccasions:[String]
selectedAttributes:[Adjective]
aromaAnswers:[Aroma]
traitAnswers:[Trait]
budget:String
deployID:Int

Figure 4.8: QuizAnswers Object Model

has a unique identifier. Quizzes taken at the kiosks also have unique identifiers. The deployID variable is the identifier used by Bottlefly to know which retail location to recommend wine from. The rest of the attributes are determined by the answers the user provides during the quiz.

First, the user is presented with a confirmation page to make sure the user is 21 years or older. The user must indicate that they are 21 years or older to continue with the rest of the quiz. The answer is stored in the over21 boolean variable of the QuizAnswers object. Next the user is asked to choose a wine color of either red or white. The response is recorded in the wineColor string variable. The user is then presented with a list of occasions that the user is choosing a wine for. The user can select up to three different occasions. The responses are recorded in a string array under the selectedOccasions variable. After the occasions are selected, the user can choose which attributes they want their wine to portray selecting up to three options. The responses are stored in the selectedAttributes variable which hold an array of Adjective objects. Each adjective object is an attribute of the wine but also has other information associated with it such as a category that each adjective falls into. The user then moves on to the Palate Profiler where the user can swipe among different aromas to gather the user's taste preferences. Each swipe indicates a yes or no response to the aroma. At the end of this screen, the aroma objects are stored in the aromaAnswers array variable. Each aroma holds variables associated with the aroma including a response variable that indicates if the user chose it or not as something they would want to see in their wine. The last screen of the quiz is the budget screen. The user can choose a price value that represents the budget they have for a particular bottle. The response is stored in the budget variable. Once the QuizAnswers object has all of its responses recorded, the object is sent to the Bottlefly recommendation engine using a HTTP post request. The recommendation engine will look at all of the responses and calculate a match value for each wine to

the user. The recommendation engine then responds to the post request and sends back the user's top recommendations as wine objects. The application reads the wine objects and then creates different pages for each wine recommendation for the user to swipe through.

Chapter 5

VALIDATION

In this chapter, the validation framework for the recommendation engine of Bottlefly will be evaluated. The evaluation will be done by a series of usability studies. Section 5.1 describes the study for gathering more data for the recommendation engine. Section 5.2 describes the user interface usability study. Section 5.3 describes the results and analysis of the user interface usability study. Section 5.4 talks about the importance of the tutorial screens.

5.1 Data Gathering Study

One aspect that this thesis aims to achieve is improving upon the recommendation engine for recommending wine. The participants of the usability study are a wide range of people with varying levels of wine knowledge. They were selected by the Bottlefly team to make sure a variety of people participated. The procedure and survey is discussed below.

The procedures of the data gathering evaluation are described below:

1. Ten preselected wines will be used in the study (five white wines, five red wines).
2. The preselected wines are unknown to the participant.
3. The users are asked to complete the survey for each wine tasted.

The survey consists of the following questions:

1. Q1: Rate the wine (Scale 1-9, with 1 being hated it and 9 being loved it)

2. Q2: What flavors and qualities, in your opinion, best describe this wine? (circle as many words as you want) The words to choose from are as follows:

Flowery	Earthy	Bitter
Zesty	Balanced	Sweet
Soft	Robust	Fresh
Crisp	Mineraly	Nutty
Smooth	Light	Meaty
Citrusy	Juicy	Jammy
	Oaky	

3. Q3: Can you think of any other flavors that describe the wine? (Fill out as many as you can think of) _____

4. Q4: Select the best occasion and setting for this wine:

   (a) Party

   (b) Romantic Date

   (c) Relaxing night at home

   (d) Beach Barbecue

5. Q5: Can you think of any other occasions? _____

6. Q6: Would you describe this wine as: (Circle one item in each row)

A.	Warm	Cool	Neither
B.	High Energy	Low Energy	Neither
C.	Feminine	Masculine	Neither
D.	Outgoing	Relaxed	Neither
E.	Traditional	Exotic	Neither
F.	Indoorsy	Outdoorsy	Neither
G.	Casual	Formal	Neither

7. Q7: Which words in your opinion, describe this wine the best? (circle as many words as you want)

Lazy	Young	Serious	Pleasant	Outgoing
Good-natured	Mysterious	Powerful	Luxurious	Delicate
Dark	Adventurous	Fearless	Artistic	Sociable
Complex	Gentle	Agreeable	Flashy	Active
Vibrant	Colorful	Round	Fiesty	Mature
Innocent	Naughty	Alive	Calm	Bright
Colorful	Elegant	Brave	Gloomy	Dangerous
Bold	Clean	Pure	Carefree	Seductive

8. Q8: Can you think of other words that describe the wine? (Fill out as many as you can think of) _____

The information gathered from these surveys was analyzed and compared to the various wines that people tasted. Each wine that was served in the study had all of the responses for it gathered together. Patterns of similar responses were searched for to see if their were commonalities between the responses. The commonalities between answers were used as the attributes the recommendation engine would consider for each wine. It is important to keep the tastings blind so that there is no bias when answering questions about the wine. If a participant knew what a certain wine was before answering the questions then they could have various opinions about it without even tasting it based on the look of the bottle, the appeal of the label, or recognizing the wine and already having prior knowledge about it. Bottlefly helps match people to various wines by knowing how people think about various wines. Matching different adjectives to the wines and seeing how participants rank the wines helps give a better idea of what words people associate with the wine and how much people like those specific characteristics in a wine. Linked with the chemical information gathered

about the wine from the gas chromatography mass spectrometry machine, a better recommendation can be assessed.

Bottlefly is still currently gathering data about the wines it recommends through analysis of gas chromatography mass spectrometry as well as through more data gathering studies that involve participants matching attributes to wine. The goal is to better understand what people associate with various wines and how those characteristics link up to the chemical properties that the wine is made of. Finding these type of links will strengthen the recommendation engine which then strengthens the mobile application. The results of this study are proprietary to Bottlefly.

5.2 User Interface Usability Study

The user interface usability study was the second and biggest study performed which provided feedback for the user interface of the mobile application. The study helped analyze the appeal, ease of use, and flow of the application.

The procedures of the usability evaluation are described below:

1. The participant will be asked to take a pre-survey.
2. The participant will be moved to a room and set up in front of a video camera with the mobile device application running in front of them.
3. The participant will go through the screens of the application while speaking their thoughts aloud about how they are feeling and what they like/dislike when using the application.
4. The participant will be interviewed after taking the wine quiz.

The pre-survey serves the purpose of gathering personal information about the participant as well as getting a general idea about their wine buying habits. The

participant is given an ID number on the pre-survey which will match the ID number on the full survey that they will take after. The pre-survey was filled out by the participants as they waited their turn to take the full survey and use the application as there was a limited amount of devices to use at once.

The method of making the participants speak their thoughts aloud as they were using the application served many good purposes for the benefits of the user interface of the application. It allowed for positive and negative feedback of the application in real time so that the feedback could be correlated with specific screens and on specific spots of those screens to see where the participant made comments. It also allowed for the data to be more genuine because they would have to speak aloud if they were confused about something compared to a paper survey where a user could either not remember how they felt about a particular area of the application or not tell the full story of how the screen made them feel while using it.

The pre-survey questions are listed below:

1. Q1: ID Number _____
2. Q2: Age _____
3. Q3: Gender
    (a) Male
    (b) Female
4. Q4: Education
    (a) High School
    (b) Some College
    (c) Bachelors Degree

(d) Masters Degree

(e) Doctorate Degree

5. Q5: How often do you buy wine?

   (a) Less than once a month

   (b) Once a month

   (c) Two to three times a month

   (d) Four or more times a month

6. Q6: Where do you typically buy your wine?

   (a) Grocery Store

   (b) Retail Store

   (c) Restaurant

   (d) Wine shop or Winery tasting room

   (e) Online

7. Q7: How much do you typically spend per wine purchase?

   (a) <$10

   (b) <$15

   (c) <$20

   (d) <$25

   (e) <$50

   (f) $50+

After taking the pre-survey, the participant is set up in front of the video camera and mobile device with the application running on it. The questions for the interview after running through the application are listed below:

1. Q1: Participant ID _____
2. Q2: Date _____
3. Q3: Time _____
4. Q4: What feelings or emotions did you experience while you were working through the app?
5. Q5: Did you find the app difficult to navigate or use at all?
6. Q6: What aspect of the application did you find difficult to navigate?
7. Q7: Was there a time while working with the app where you felt the urge to discontinue using the tool?
8. Q8: In the application, did you find the order of the questions were asked in to make sense?
9. Q9: If no, why not?
10. Q10: Please rate the visual appeal of the app on a scale of 1-5 with 5 being the best.
11. Q11: What made the visual appeal of the app seem appealing/unappealing?
12. Q12: How likely would you be to install and use Bottlefly as an app?
13. Q13: What would it take for you to definitely install the Bottlefly app?
14. Q14: How likely would you be to use Bottlefly as an in-store kiosk?
15. Q15: What would it take for you to definitely use the application/kiosk?
16. Q16: Does the application feel finished/complete?
17. Q17: Would you recommend this application to a friend?

18. Q18: What would it take for you to recommend this application to a friend?
19. Q19: What is your overall mood after working with the Bottlefly application?
20. Q20: What additional comments or suggestions do you have for the application as it gets developed further?
21. Q21: If we have further questions, could we reach out to you?

The video footage was played through and analyzed after all the participants had gone through the process. This study was done in a multi-step process. An iterative approach was taken to gather results for an initial group of people and then the feedback was analyzed. After the feedback was analyzed, the changes that needed to be made were implemented into the application. The next group of participants in the study would then get to go through the same process but with the improved implementation. The results of the usability study can be seen in Section 5.3.

5.3 Results and Analysis

The results of the usability study will be separated into two groups. The first set of results is from the first round of participants who went through the whole process of taking the pre-survey, running through the application, then having the interview at the end. The second set of results will cover the results from the second group of people after the new version of the application had been implemented based on the first group's feedback. There were 31 participants in the user study with two main age demographics, Millennials and Generation X. There were 15 participants who were between the ages of 21-37 years old and 16 participants who ranged between the ages of 38-56 years old.

5.3.1 Group One Results

The results from the first group of participants are analyzed below.

- What feelings or emotions did you experience while you were working through the app?

The emotions during the initial run of the study ranged widely from fun and excited to confused. Most people liked the idea of the application and were excited to get a recommendation for wine. While it was exciting for a lot of the participants, some also felt confused by the application. On the Palate Profiler where the user swipes through different aromas, users felt confused by the question that was being presented to them. The question was "Does this smell bother you?" followed by an image of the particular thing that produces that smell. Some users felt confused when answering yes or no to that question because they felt like it was a double negative and would answer the question incorrectly. Some also felt that they didn't understand where the app was going when they were swiping though the different aromas. They weren't sure why they were answering those questions. The participants also noted that they weren't sure how far they had to keep going until they received a wine recommendation. They didn't feel a sense of where they were within the quiz.

On the brighter side of the responses, a lot of users felt excited about the potential for the application. They felt as if it was on the right track but needed the application to be more clear as to why the user was answering certain questions and how the recommendations were being generated. Some users also felt neutral about the application while others were intrigued by it.

- Did you find the app difficult to navigate or use at all?

Value	Percent	Count
Never	23.5%	4
Rarely	41.2%	7
Sometimes	35.3%	6
Always	0.0%	0
Total		17

Table 5.1: Navigation Results Round 1

These results show that 76.5% of the participants felt confused at some point during the process of navigating through the application. Participants pointed out that there was no back button so they couldn't go back and change an answer which was frustrating. They also didn't have a sense of when the quiz would end and how many questions they would have to answer before getting their recommendation.

- What aspect of the application did you find difficult to navigate?

Majority of the participants felt the missing back button hindered the navigation of the application. Also some users were not aware of the swiping functionality when going through the different aromas and only used the thumbs up and thumbs down button to input their responses.

- Was there a time while working with the app where you felt the urge to discontinue using the tool?

Value	Percent	Count
Yes	37.5%	6
No	62.5%	10
Total		16

Table 5.2: Urge To Discontinue Results Round 1

The results of the first study show that a fair amount of people felt the urge to discontinue using the application. Although most people did not feel this urge, the people that did felt so because of the confusion they experienced when using the application.

- In the application, did you find the order the questions were asked in to make sense?

Value	Percent	Count
Yes	82.4%	14
No	17.7%	3
Total		17

Table 5.3: Order of Questions Results Round 1

The majority of the participants felt that the order the questions were asked in made sense. The reason for why some people thought the ordering didn't make sense is described in the next question.

- If no, why not?

People that were confused by the ordering of the screens indicated that they would prefer a screen that introduces the different sections of the quiz to make it more clear.

Some users also indicated that they would have liked the adjective question to be right after the occasion question. Within the Palate Profiler, some users would have liked to see some categorization between the different aromas such as 'fruits' or 'ambience'.

- Please rate the visual appeal of the app on a scale of 1 to 5.

Value	Percent	Count
1	0.0%	0
2	23.5%	4
3	58.8%	10
4	17.7%	3
5	0.0%	0
Total		17

Table 5.4: Visual Appeal Results Round 1

Out of the first round participants, 76.5% of them gave the overall visual appeal of the application a score of 3 or higher out of 5. This indicates that the app is on the right track and has room to improve once the feedback from the studies are implemented.

- What made the visual appeal of the app seem appealing/unappealing?

The aspects that people thought made the application appealing was the tinder swiping aspect when going through the different aromas. They felt the main visual "wow" factor was the Palate Profiler when swiping because it has animations and engages the user.

The aspect that people thought was unappealing for the application was that it felt like it wasn't completely finished yet. People liked the clean and simple design

of the applications but felt it could still be polished up with minor things that would add up to make the overall app more appealing. People wanted to be able to interact with the application more instead of being shown a list of adjectives for wines to choose from.

- How likely would you be to install and use Bottlefly as an app?

Value	Percent	Count
Definitely Not	13.3%	2
Highly Unlikely	6.7%	1
Unlikely	13.3%	2
Likely	33.3%	5
Highly Likely	26.7%	4
Definitely	6.7%	1
Total		15

Table 5.5: Likeliness To Install Results Round 1

Two-thirds of the participants indicated with a positive response that they would install the application and use it to get wine recommendations. The reasons why some participants would not install and use the application are highlighted in the next question.

- What would it take for you to definitely install the Bottlefly app?

The participants indicated multiple different reasons that it would take for them to download the application. One of the main things that would make people download the application is if it gave out promotions on the wine they were recommended. Others would also want to know that they could trust the application. They would

want to hear about the application from a friend first or use the in-store kiosk first to see how good it was and then download the application on their phone. Some also indicated that they would install the application as long as it was free or a very low price. Some users also indicated that they rarely buy wine and rarely download apps to their phone which could be the reason for some of the responses for not wanting to download the application.

- How likely would you be to use Bottlefly as an in-store kiosk?

Value	Percent	Count
Definitely Not	6.7%	1
Highly Unlikely	0.0%	0
Unlikely	0.0%	0
Likely	26.7%	4
Highly Likely	33.3%	5
Definitely	33.3%	5
Total		15

Table 5.6: In-Store Kiosk Results Round 1

Out of the participants of the first round, 93.3% of them indicated that they are either likely, highly likely, or definitely bound to use the application as a kiosk in the wine aisle. This is promising because if people are willing to use the application as a kiosk then that can build trust for the recommendation system and make people feel better about downloading the application on their own devices.

- What would it take for you to definitely use the application/kiosk?

The participants indicated that when they are shopping in a store that they usually want to be able to get in and out as fast as possible. They would want the kiosk to

show that it only took a few minutes at most to get a wine recommendation. They also would be likely to use it if coupons were given out for the wine. Other participants said that they would always use it to get a new bottle of wine recommended to them each time.

- Does this application feel finished/complete?

Value	Percent	Count
Yes	40.0%	6
No	60.0%	9
Total		15

Table 5.7: Completeness Results Round 1

Majority of the participants indicated that the application did not feel finished to them. Based on the feedback received from the other parts of the interview, there is still room for improvement in the application but people still tend to like it and feel excited about it. Making the application feel more polished and complete will make the users feel more comfortable using the application.

- Would you recommend this application to a friend?

Value	Percent	Count
Definitely Not	0.0%	0
Probably Not	6.7%	1
Maybe	13.3%	2
Probably	46.7%	7
Definitely	33.3%	5
Total		15

Table 5.8: Recommend To Friend Results Round 1

From the participants in the first round study, 80% of them indicated that they would probably or definitely recommend the application to the friend. This confirms other findings where people are excited about the idea of the application and are excited enough to actually recommend it to their friends.

- What would it take for you to recommend this application to a friend?

The participants of the first round study indicated that they would want to see the recommendations be successful before recommending it to a friend. They would want to try it out a couple times with successful recommendations. The participants would also want to feel more comfortable with the application before recommending it to friends. Some of the participants were confused by some of the words in the application so they would want something that can clarify the meaning of words as well as just making the app more complete. Having a system in place that can reward people for recommending to friends also would attract people to spread the word about the application.

- What is your overall mood after working with the Bottlefly application?

After working with the overall application and getting a better understanding of what it does, people were generally excited for the application to progress so that they could use it in stores and on their devices. People indicated that they wanted to drink wine now because they finally had a way to find a wine that would be selected for them. The users also indicated that when they changed their mindset to "I'm doing this to buy the best wine" then the purpose of the application became more clear. The users could have lost track of the purpose of the application while standing in the San Luis Obispo Hothouse instead of in a wine aisle at a retail store.

- What additional comments or suggestions do you have for the Bottlefly as the app is further developed?

Besides just getting a wine recommended to them, people wanted to know where they could get the wine. Having GPS and mapping functionality in the application would make for a better application so that the user can actually find what they are recommended. The participants also said that they want to see the app get further developed and for the Bottlefly team to keep pushing forward until the product is in production. Adding more clarifying information about the wines being recommended was also suggested to enhance the recommendation.

5.3.2 Group Two Results

The results from the group one participants were analyzed. Once the feedback had been analyzed, the application had the new features and recommendations from the feedback implemented into it. Some of the changes that were implemented into the application from the first study was the ability to navigate back and forth through the wine quiz so that users could go back and change their answers. The use of the adjective cloud over the table layout for choosing wine attributes was also implemented into the application. To ease the amount of confusion during the wine quiz, tutorial screens were added before some of the questions to give users more context as to why they were answering certain questions. The aromas that the users swipe through were also updated as well as the phrasing of the questions to be phrased more positively. The phrasing of the question in the Palate Profiler went from "Does this smell bother you?" to "Do you like this aroma?". The results from the second group of participants are analyzed below with the new implementation.

- What feelings or emotions did you experience while you were working through the app?

The feelings expressed in the second run of the study were much more positive than the first run. Multiple people said that it was fun, nice, and easy to use. Some of

the responses indicated that they really felt like the application would help them make their decision on what wine to buy and not feel overwhelmed by the huge selection of wine. Some participants still felt that the application was underdeveloped and had room for improvement. Some participants also indicated that they felt the flow of the application was interrupted by the newly added tutorial screen because it was too wordy.

- Did you find the app difficult to navigate or use at all?

Value	Percent	Count
Never	38.5%	5
Rarely	23.1%	3
Sometimes	38.5%	5
Always	0.0%	0
Total		13

Table 5.9: Navigation Results Round 2

The results show that almost two-thirds of the participants rarely or never felt the application was difficult to navigate or use. This is most likely due to the fact that a back button was added so that users could go back to previous questions and change their answers. Also the screens were ordered to build up the questions from one click, easy to answer questions, to more interactive questions such as the Palate Profiler.

- What aspect of the application did you find difficult to navigate?

The participants indicated that they either found no points of the navigation confusing or they found that the tutorial screens felt like interruptions. They indi-

cated that they would be answering questions and then abruptly get stopped and overwhelmed with a lot of words to read before moving on to the next question.

- Was there a time while working with the app where you felt the urge to discontinue using the tool?

Value	Percent	Count
Yes	30.8%	4
No	69.2%	9
Total		13

Table 5.10: Urge To Discontinue Results Round 2

Majority of the participants never felt the urge to discontinue using the application. The percentage for the amount of people that didn't feel this urge went up in comparison to the first round study indicating progress in the application. The reasons that some people felt to the urge to discontinue was because of the aromas they were being asked to analyze. The participants mentioned that they would like some of the items as food but not as something they would like to taste in their wine.

- In the application, did you find the order of the questions were asked in to make sense?

Value	Percent	Count
Yes	92.3%	12
No	7.7%	1
Total		13

Table 5.11: Order of Questions Results Round 2

All of the participants except for one in the second round indicated that they felt the order of the screens to make sense. The reasons for why they may not have made sense are discussed in the next question.

- If no, why not?

Some of the participants indicated that they weren't sure about the feedback on what the ordering should be but that they thought there should be more questions about attributes of the wine such as it being robust, light, or sweet etc. Most people agreed with the current ordering of the screens.

- Please rate the visual appeal of the app on a scale of 1 to 5.

Value	Percent	Count
1	7.7%	1
2	15.4%	2
3	15.4%	2
4	53.9%	7
5	7.7%	1
Total		13

Table 5.12: Visual Appeal Results Round 2

Out of the second round participants, 77% of them rates the visual appeal with a score of 3 or more out 5. The people that gave it a score of 2 or lower felt that the application felt underdeveloped and still had some room for improvement.

- What made the visual appeal of the app seem appealing/unappealing?

Many people when first presented with the application liked the look and feel of it but felt that there needed to be a more consistent theme throughout the screens. Some participants also pointed out that they felt the recommendation screen felt cluttered and could be organized in a more spaced out and readable fashion.

- How likely would you be to install and use Bottlefly as an app?

Value	Percent	Count
Definitely Not	7.7%	1
Highly Unlikely	7.7%	1
Unlikely	7.7%	1
Likely	38.5%	5
Highly Likely	38.5%	5
Definitely	0.0%	0
Total		13

Table 5.13: Likeliness To Install Results Round 2

Out of the participants in the second round study, 77% of them indicated that they would either be likely or highly likely to install and use Bottlefly as an application. This indicates that the application does bring value to people and people are looking for a solution to help them choose a wine in the wine aisle.

- What would it take for you to definitely install the Bottlefly app?

The participants indicated that in order for them to definitely install the application, they would need the application to be simple to navigate through as well as see how well the recommendations actually work. They would also be more apt to use it if they heard about it from friends and saw how it worked for them.

- How likely would you be to use Bottlefly as an in-store kiosk?

Value	Percent	Count
Definitely Not	0.0%	0
Highly Unlikely	0.0%	0
Unlikely	0.0%	0
Likely	0.0%	0
Highly Likely	76.9%	10
Definitely	23.1%	3
Total		13

Table 5.14: In-Store Kiosk Results Round 2

All of the participants in the second round study indicated that they would either be highly likely or definitely bound to use Bottlefly as an in-store kiosk. These are promising results because many of the participants also indicated that they would be likely to use Bottlefly as an application on their mobile device once they saw that the recommendation system actually worked so users will be able to test out how it works in stores first and then download it once they have gained trust in the system.

- What would it take for you to definitely use the application/kiosk?

The participants indicated that they would definitely use the kiosk if they had the time to use it as well as if it worked for them the first time. Most participants are open to using the system for a first time and then would continue using it if it had successful results. Having incentives such as a coupon would also make more users want to use the system.

- Does this application feel finished/complete?

Value	Percent	Count
Yes	23.1%	3
No	76.9%	10
Total		13

Table 5.15: Completeness Results Round 2

Although the majority of the participants indicated that the application did not yet feel complete, users still wanted to use the system as a way to get recommended wine. Analyzing the feedback from all of the studies and implementing the feedback into the system will make the application feel more complete and up to the users standards.

- Would you recommend this application to a friend?

Value	Percent	Count
Definitely Not	0.0%	0
Probably Not	0.0%	0
Maybe	23.1%	3
Probably	46.2%	6
Definitely	30.8%	4
Total		13

Table 5.16: Recommend To Friend Results Round 2

Out of the participants in the second study, 77% of them indicated that they would either probably or definitely recommend the application to a friend. The improvements that can be made to make sure they would definitely recommend the application to a friend is discussed in the next question.

- What would it take for you to recommend this application to a friend?

Many of the participants indicated the willingness the recommend the application to a friend but they would be more apt to if they had trust that the recommendation would give them a successful result each time. They also wanted to see the improvements from these studies be implemented into the application to make it look more complete and production ready.

- What is your overall mood after working with the Bottlefly application?

Majority of the participants indicated that the application made them want a glass of wine. Some even said they wished it was ready to use so that they could use it for an upcoming event. The participants also indicated that they were excited about the application and eager to see it in stores and on the App Store. Some participants did feel that they were confused by the application because of it not feeling complete yet.

- What additional comments or suggestions do you have for Bottlefly as the app is developed further?

The participants indicated that the flow of the application needed to be smoothed out so that the users aren't stopped in their tracks on screens with a lot of reading. Many of the participants indicated that they could see the product working out great and that they see the potential for it. A suggestion was also brought up about a feature for users to be able to select a certain type of wine and get recommendations that are only of that specific type.

The results from the second round study lead to the application becoming more complete. The ability to see locations on a map was added as well as the ability to choose a location before taking the wine quiz so that the user can get recommended

wine at the location most convenient for them. The Palate Profiler also had traits added it so that users can swipe through various aromas as well as different traits they would want to see in their wine such as sweetness, acidity, bitterness, and astringency. Adding the traits helps the recommendation engine give a better recommendation which will make users more likely to use the application.

5.3.3 Comparison of Group Results

When the results of the two studies were analyzed and compared together, the study shows that the application improved over time based on the participants feedback. When asked if the application was difficult to navigate, more people in the second study indicated that they never found the application difficult to navigate compared to the first study. This shows that based on feedback from the first study, the navigation was improved with the addition of a back button so that users could go back and change their answers if necessary. The second study also showed a decrease in the amount of people that felt the urge to discontinue using the application compared to the first study. The ordering of the screens was also more pleasing to users in the second study after implementing the feedback from the first study.

In the first study, the majority of the participants rated the visual appeal of the application with a score of 3 out of 5. In the second study, the majority of participants rated the visual appeal with a 4 out of 5. The first study also had no one rate it with a perfect score of 5 out of 5 while the second study did have a participant rate it with a 5. The categories of 'likely' and 'highly likely' also grew in the second study when users were asked how likely they were to install and use the Bottlefly application. The first study had 33.3% of its participants indicate negatively about whether they would install the application while the second study decreased to 23.1% of the participants giving a negative response to this question.

When users were asked about the likeliness to use Bottlefly as an in-store kiosk, the first study results were evenly spread between the likely, highly likely, and definitely responses with one participant indicating definitely not. The second study had all of its participants rate positively within the two positive responses of highly likely and definitely. The completeness of the application received mainly negative responses in both of the studies indicating that there is still more work to be done until the application is ready for production. The participants of the first study indicated with mostly positive responses that they would recommend the application to a friend with one participant indicating that they would not. The second study results show that all participants indicated either a positive response or neutral response with no negative responses about recommending it to a friend.

Figure 5.1, 5.2, and 5.3 shows the before and after of some of the screens from the wine quiz based on feedback.

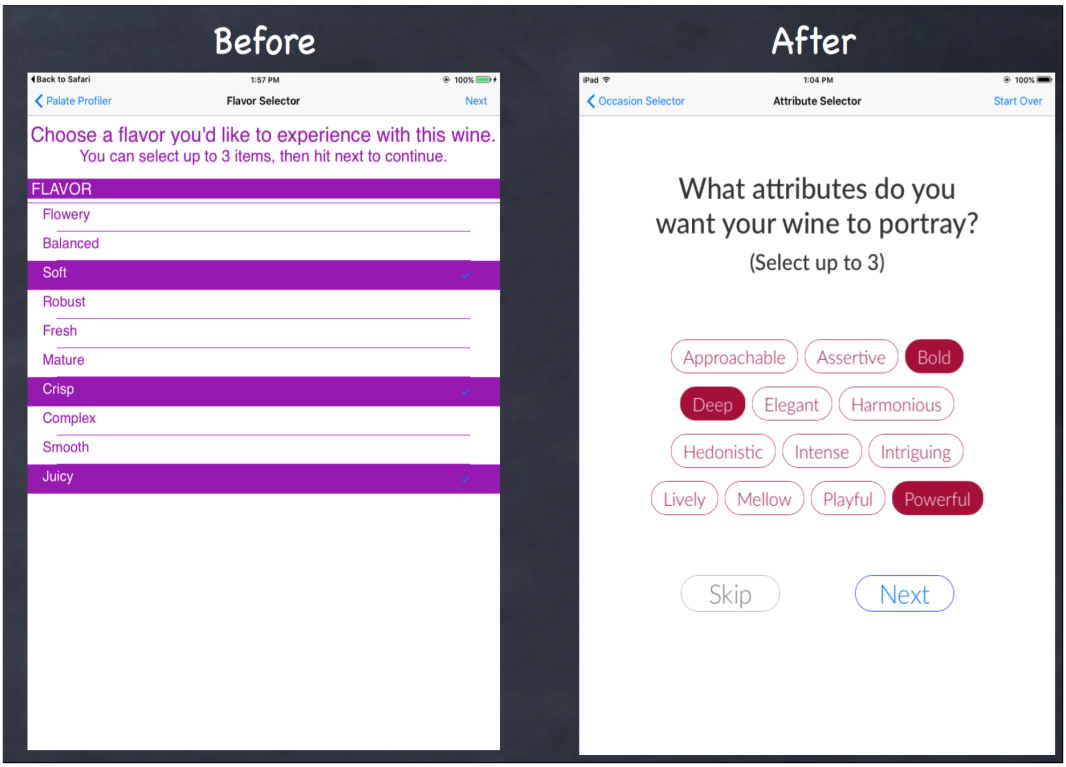

Figure 5.1: Table View to Adjective Cloud

Figure 5.1 shows how the attributes were initially selected through a table view. To engage the users more and keep a consistent theme to the application, the adjective cloud design was chosen so that you could see all the words at once and easily make multiple selections.

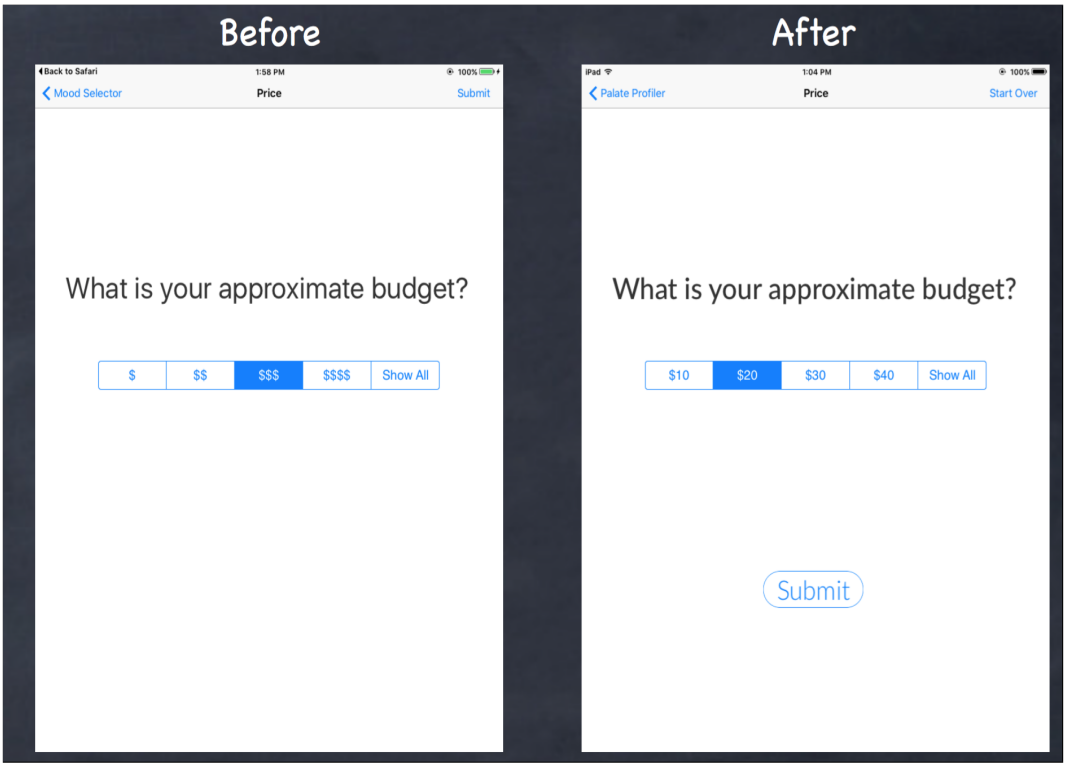

Figure 5.2: Dollar Signs to Monetary Values

Figure 5.2 shows the evolution of how the budget is chosen. Initially the budget was chosen with dollar sign symbols but from the feedback of the user study, the results show that people prefer to see a dollar amount for the budget that they are selecting.

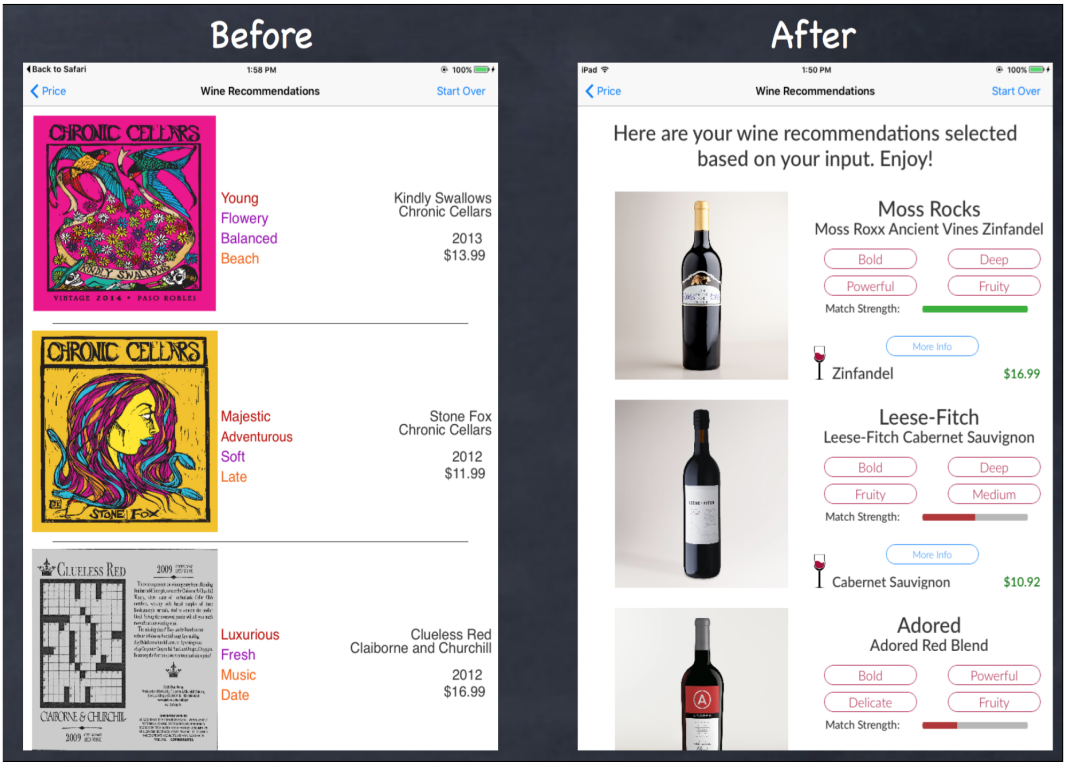

Figure 5.3: Wine Labels to Wine Bottle Images

Figure 5.3 shows how the recommendation screen went from showing images of the wine labels to images of the bottles themselves. Users preferred to see the whole wine bottle and more information was added to each recommendation as well as cleaned up to fit the design of the rest of the quiz. Figure 5.4 shows the current state of the recommendation screen. Users felt that the recommendation screen was too busy so each recommendation was broken up into its own page and the user can swipe through the different pages to see each of their recommendations.

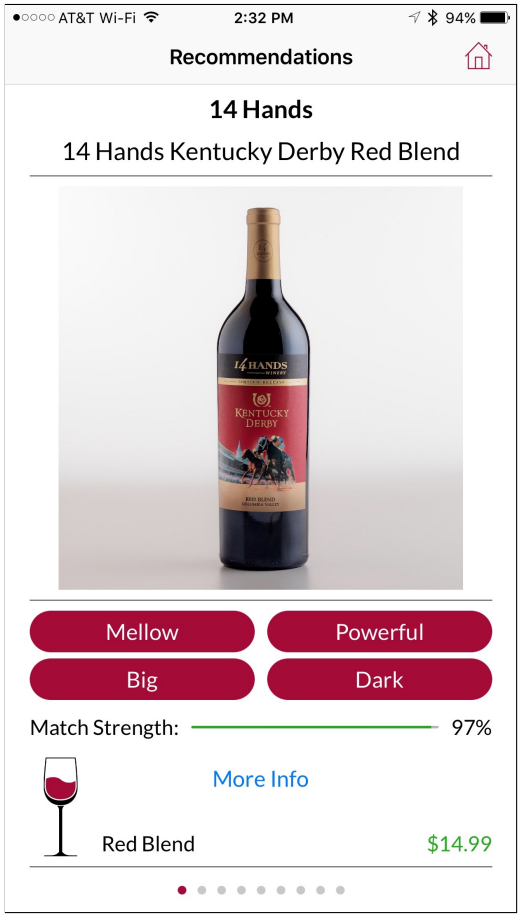

Figure 5.4: Current Recommendation Screen

5.3.4 Frequency of Feedback Ideas

The frequency tables, Table 5.17 and Table 5.18, represent the number of times a certain idea was mentioned during the study. Table 5.17 represents the results from Millennials and Table 5.18 represents the results from Generation X.

The frequency of ideas from each group was taken into account when doing new iterations of the implementation for the application. The frequency tables help show what ideas people agree on the most and what features they want the application to have. It also helps point out the flaws that the application has and helps determine the areas that the application needs to improve in.

Features Interviewees Recommend	Count
Confused on some smells - anise, barnyard, asparagus	9
Conflicted on choosing taste vs. smells and purpose	7
Prefers specific dollar amounts to dollar signs	7
Lost interest part way through, fewer questions	7
Include Food Pairings	5
Finds "Show All" button confusing	4
Wants to see level of strength of recommendation/match	4
Wants higher quality pictures, more consistency	4
Would like to see origin location of wine	3
Green thumbs up, red thumbs down	3
Would like to see location of wine in store	2
Doesn't understand wine lingo (robust, etc.)	2
Wants to be able to select multiple occasions	2
Needs typography hierarchy: title of wine, price, type, etc.	2
Does not care for color pallet - more consistency	2
Thinks will be helpful for "overwhelmed" wine buyers	2
Wants to see bottle, not just label	1
Wants to see wine ratings	1
Categorizing aromas - veggies, ambiance, etc.	1
Would like to see alcohol content	1
Wants to see larger buttons	1
Wants to see a guided introduction of how the app works	1
Simplify wording	1

Table 5.17: Millennial Frequency Table

Features Interviewees Recommend	Count
Budget Page Monetary Range	8
Fewer Words in Questions	8
Tutorials on Segments of the App	5
Clearer Pictures	4
Arrows/Next for Navigation	4
A Clear Indication of an Ending	4
Simple/Seamless Navigation	3
Consistent Text Size and Font	3
Wine Recommendation Should Include Type of Wine	3
Personalized Message in Results	2
Questions to be 'preference based'	2
Thumb Up, Green/Down, Red	2
Consistency in Palate/Aroma Profiler	2
Removal off-putting 'Flavors'	2
Map of Wine Location in Store	1
More "Sexy" App	1
Wine Rating Mechanism/Tool	1
List of Favorite Wines	1
Wine Suggestions Based on Rating	1

Table 5.18: Generation X Frequency Table

5.4 Tutorial Screens

The tutorial screens were one of the biggest requests in terms of making the reasons for answering certain questions more understandable. Users were getting confused as they would go through the application as to why they were answering certain questions and how certain questions pertained to getting a wine recommendation. Instead of just jumping into each question, a tutorial screen was added to help clarify for the user what was coming up next.

Figure 5.5: Tutorial Screen #1

Figure 5.5 shows the tutorial screen that gives the user context about choosing an occasion and adjectives to help narrow down a particular wine that will fit the user's needs. Wine is often bought for a specific occasion or to make the drinker

feel a certain way. People can usually specify why they would like to drink a certain wine. A certain wine may seem fitting for a relaxing night in while another wine may seem fitting for a dinner party or celebration. Many users when all of a sudden asked what occasion they wanted a wine for or what mood they wanted the wine to fit were confused as to how to answer the questions because users weren't sure if they were answering the question for the wine to fit a certain mood or for what the mood the wine would put them in. The tutorial screen serves as a way to point the user in the right direction as to the context the questions are being asked in.

Figure 5.6: Tutorial Screen #2

Figure 5.6 shows the tutorial screen that was added after the initial feedback from group one of the usability study. It explains that the Palate Profiler is trying

to get a sense of the users preferences for certain flavors and smells. It also reassures the user that no matter how they answer the following questions, their wine will not necessarily taste like the items that they indicate they like. A major concern for many users was whether or not their wine would taste like gasoline for instance. Gasoline was originally one of the aromas that a user could indicate whether they liked or not. Some people do like the aroma that gasoline gives off but that doesn't mean you would want to drink something that tastes like gasoline. Bottlefly uses that gas chromatography mass spectrometry method to analyze the chemical properties of wine. A wine may be found to have similar chemical properties as gasoline and if a user indicates they like the aroma of gasoline, then a wine with similar properties as that could be a potential match for that user but it doesn't mean that the wine tastes like gasoline.

Chapter 6

FUTURE WORK AND CONCLUSIONS

The Bottlefly wine recommendation application has proved itself as an application that people are excited about and want to see in stores and on their phones. This thesis covers the initial implementation of the application to get user feedback on design as well as analyze the market need for such a product. The results of all the studies show that the users wants a polished application that is fast and easy to use so that they can get a wine recommendation as quick as possible. Section 6.1 talks about how a new screen ordering can make the app even easier to work through in the future. Section 6.2 talks about the application being in production in the future and other potential markets Bottlefly technology could be used for. Section 6.3 summarizes the conclusions.

6.1 Screen Ordering

The ordering of the screens in the quiz is an important aspect to the flow of the application. The main task of the quiz is to swipe through the aromas to help the Palate Profiler build up its knowledge about the current user. The Palate Profiler is what Bottlefly refers to as the section of the quiz where the user swipes through aromas.

Figure 6.1 shows the initial ordering of the screens for the quiz. Users have to always confirm their age first to make sure they are 21. The next screen leads into the choosing of the color of wine that the user wants to be recommended. The tutorial screen is the next screen to be seen by the user. Figure 5.5 shows this tutorial screen. The next screen is the occasion selector followed by the attribute selector screen where

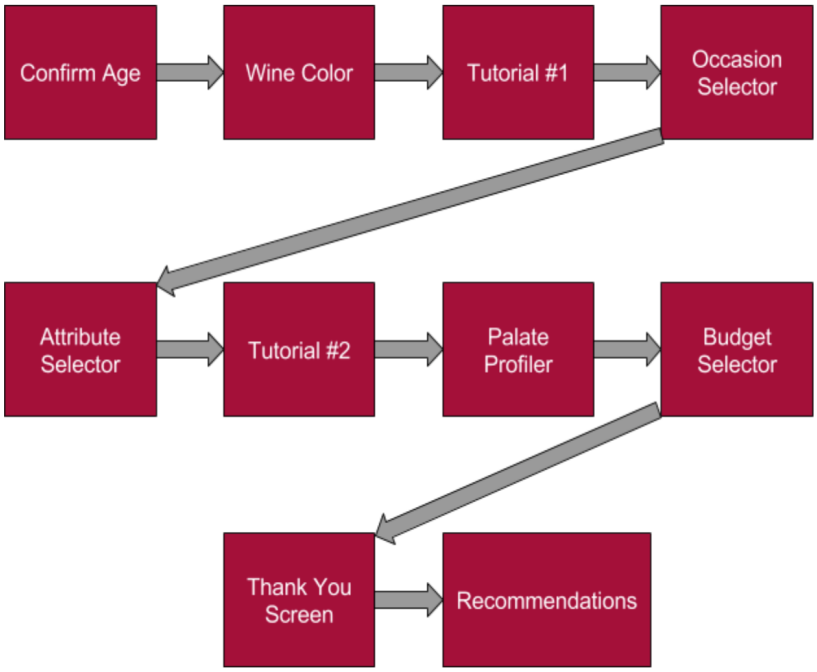

Figure 6.1: Old Quiz Screen Ordering

the adjective cloud is shown in Figure 4.1. The second tutorial screen is shown which prepares users for the Palate Profiler. This tutorial screen can be seen in Figure 5.6. The user is then presented with the Palate Profiler screen where they can swipe to indicate their answers. After the Palate Profiler is finished then the budget selection screen is shown. Once the budget has been selected, a thank you screen appears with an activity indicator showing while the recommendations are being calculated. Once the recommendations have been calculated then the recommendations show up.

Figure 6.2 shows the new arrangement of the screens for the quiz. The main differences in the ordering of the screens is the removal of the tutorial screens and moving the Palate Profiler closer to the beginning of the quiz. These changes were made to increase user engagement as well as speed up the time the user spends using the application. The new ordering of the screens also better fits the flow of a conversation that a user might have with a sommelier to find a wine. The tutorial

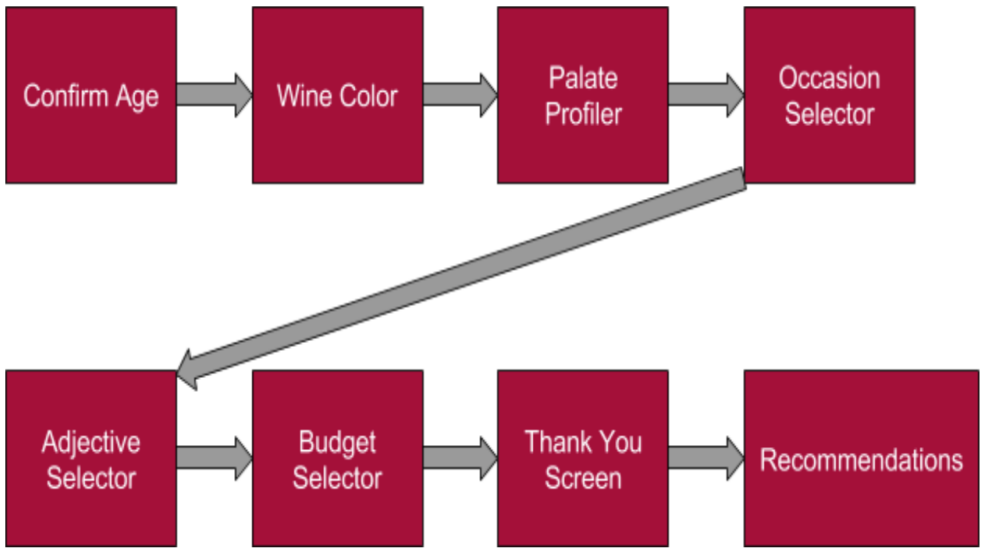

Figure 6.2: New Quiz Screen Ordering

screens initially were not present in any iteration of the quiz but after running some usability test feedback, they were added in to help give context to what the user was doing in the application and why they were doing it. In future iterations of the application, the tutorial screens will not be thrown away completely but will instead be integrated with the screens that they were helping give context to. For example, when swiping through different aromas in the Palate Profiler, users will be able to click on a button that helps explain the reason for asking that specific question. Users will also be able to get definitions of various aromas and how they relate to wine. Integrating this help into the screens they are helping with will cut down on the number of screens the user will have to go through and will only need to be used by the users that require extra context about the questions. This will help users that have used the product before speed through the application more quickly but still provide help for new users so that people can get there wine recommendation more quickly with the same accuracy.

6.2 Bottlefly in Production

The work that lies ahead for the application is taking the user feedback from the second study and implementing all the changes into it to get it production ready. Bottlefly has already been in the process of partnering up with various retail locations to get the system in stores for customers to use. The excitement about the product is not only there for customers but it is also present for retail where the product will be hosted.

The technology that Bottlefly uses has the potential to spread to different markets besides wine. Analyzing the chemical properties of wine helps match the user to the best fitting wine available when compared to a user's taste preferences. This same idea can be extended to other markets such as beer, tea, coffee, cheese, and perfume. Once the recommendation system proves successful with wine, these other markets can be tapped into.

6.3 Conclusions

In this thesis, the design of a mobile application to recommend wine is analyzed. The application was implemented and then validated with various studies. The first type of study was a study that required the participants to blindly taste wine and then select attributes from a word bank that helped describe the wine. This helped build up the recommendation system that the application uses to help people better be matched to potential wines. The second type of study was a user interface usability study that took an iterative approach. The first version of the implementation was produced and then analyzed by participants who pointed out the positives and negatives of the design's potential readiness for production, ease of use, and flow. Feedback was taken from each round of the study and implemented into the application where the

next round of participants would analyze the new and improved implementation. The results were promising in terms of the excitement for the idea and willingness of people to use the application. Many design changes were made based off the feedback of users to build an application that fits the wants and needs of the user. With more iterations of improvements to the design, the application will be ready to go into retail locations as well as the App Store for users to get personalized wine recommendations.

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